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THE DEVELOPMENT OF A EUROPEAN DIGITAL MARKET ON THE BASIS OF THE TRANS-EUROPEAN TELECOMMUNICATIONS NETWORKS

ABSTRACT

The development of telecommunications technology is currently one of the main driving forces, but also constraints, for the transport industry. Every year brings an increase in the number and complexity of modern transportation systems, including ITS and C-ITS, taking full advantage of the cutting-edge opportunities offered by telecommunications systems. Cities invest in intelligent traffic control systems and the technology of autonomous vehicles is already a reality. Under the circumstances, the most important goal is to create a digital single market. The existing telecommunications networks of the Member States are very different from each other, also in terms of their quality and pricing. The Internet and telecommunications services are already an integral and inseparable part of the economy and life of the inhabitants of Europe. While the digital single market brings many benefits, it must also overcome a number of both known barriers and those that have yet to be identified. This article presents the evolution of the Trans-European Telecommunications Network and the requirements that should be ensured for interoperability and competitiveness of telecommunications in the coming years. The next section outlines the factors that will influence the development of the information society related to the three-pillar strategy. As highlighting the value of IT education and access to information technology, the European countries' analysis of IT skills and the development of society based on the Human Development Index was presented. A new phenomenon and a notable feature of science is the understanding of the value of IT education and telecommunications for the development of small states, which should be explored and analyzed

in terms of economic development in relation to IT education and telecommunications within the digital single market.

KEYWORDS

telecommunications, Internet skills, digital single market, trans-European telecommunications networks

INTRODUCTION

European integration requires action in many areas if the citizens are to feel that they live in one Community. Over the years, many concrete initiatives have been undertaken in the field of transport infrastructure. Trans-European transport networks were designed to develop a system of interconnected railways, roads, and airports with a view to ensuring efficient transportation across the entire Community. Those efforts were indeed indispensable and have proven to be effective. Importantly, a major element of the trans-European network initiative, which was crucial to its success, was an appropriate system of infrastructure financing.
In recent years, significant EU funding has been devoted to cross-border transport infrastructure projects involving more than one Member State. Poland is a good case in point: over a short period of time (2007–2015) more than 3000 km of motorways and express ways were constructed, which is a record achievement in Europe. However, that would not have been possible without financial aid from European Union funds. If investments had been made without a broader, trans-national perspective, they would have led to a disintegrated transport system. Then, traveling around the EU would entail impediments such as more transfers between different vehicles or discontinuous roads (given the increased travel speeds afforded by new technologies, those problems would occur with greater frequency while transiting smaller countries).
The objective of the paper was to identify the functions and performance of the single digital market developed on the basis of trans-European telecommunications networks.

1. THE HISTORY AND EVOLUTION OF TRANS-EUROPEAN TELECOMMUNICATIONS NETWORKS

Research on networks as organizational forms and as opportunities arising from internationalization processes necessarily touches on the field of international business. Importantly, as defined above, networks "depend upon physical infrastructure being in place to support their interactions across space." Therefore, research on networks should also encompass access to markets and the process of gaining that access [1].
Foundations for a common telecommunications policy were laid down already in the Maastricht Treaty. Subsequently, pursuant to Council Regulation No 2236/95/EC of September 18, 1995 the European Commission launched a program for trans-European telecommunications networks (eTEN), with further guidelines, priorities, goals, and lines of action proposed in June 1997 [3]. The eTEN program was designed to establish and develop an open-access network of links between its users, thus forming a "global information society" facilitating deeper integration [12]. These goals are to be achieved through the freedom of operators to implement networks supporting platforms conducive to social advancement [2].

Prerequisites for the development of interoperable telecommunication networks include [12]:
- financing of investments directly for the users and access to global information resources,
- a global scope of services,
- infrastructure that enables mass delivery of information and supports the applications and services which were previously deployed and other networks.

If telecommunication companies became able to adapt to the EU requires their must implement a series of changes inside and both organization of process and organizational structure. [7]

The initial eTEN program has been replaced by the Connecting Europe Facility, which fosters the development of three strategic areas, namely transport, energy, and telecommunications networks to further the objectives of the Europe 2020 strategy.

In 2013, the European Economic and Social Committee issued an opinion on the amended regulation of the European Parliament and the Council concerning trans-European telecommunications networks. The main goal of the European digital agenda is the implementation of cross-border, public Internet services for consumers and enterprises to remove impediments and improve mobility. The recommended minimum broadband transmission speed is 1 Gb/s (or more, where possible). While the budget was eventually downsized from €9.2 billion to €1 billion, the European Investment Bank has been allowed to participate in projects [13].

In addition to transport and energy, the third constituent element of the trans-European networks program is the development of telecommunications networks (TEN-Telecom) with the aim of extending online services on a European scale and establishing a digital single market. These networks will also provide an infrastructural backbone for e-government, enabling the public administration to efficiently use the Internet to better and faster serve the citizens of the European Community. Moreover, trans-European telecommunications networks are designed to interconnect national telecommunications networks, which will result in harmonized services and reduced prices. The development of TEN-Telecom is of particular importance in an era when the Internet and advanced communication have become integral and inseparable elements of the economy and human life.

Beginning in mid-2017, mobile operators will be obligated to charge the same rates for calls, text messages, and data transfer throughout the territory of all Member States.

2. RATIONALE FOR DEVELOPING THE DIGITAL SINGLE MARKET

Taking into consideration recent developments, the emerging opportunities for society may be defined as pursuit of technologically unconstrained access to information. The trend of broad information accessibility, reflected in information and communications technologies (ICTs) available for everyone, on a range of devices, in different places, and with adequate quality, is a driving force for many areas of life. In addition, due to advances in logistics, and especially transportation, some markets and economies may grow faster and more efficiently than others. This development depends on many factors; those most relevant to empowerment of society and business are:

1. a free telecommunications market (access to many services from many operators),
2. access to many telecommunications operators regardless of one's country of residence,
3. harmonized telecommunications law and uniform operator/customer contracts,
4. a level playing field,

5. common telecommunications networks (consolidation),
6. a seamless market.

At the same time, the above factors indicate a strong relationship between the globalization of the economy and the market on the one hand, and many areas of social development on the other, e.g., in terms of tourism, transport, and availability of goods and services.

For development of the EU economy is important to have a well cooperating companies that will able to create new technology standards and commercialize them in to the market [10]

Today's Europe has the potential to take a leading position in the digital economy, but unfortunately it has not been fully exploited. This is largely due to a range of barriers and fragmentations, which persist in the digital sphere, even though they have been largely removed from the physical market. The elimination of those impediments is projected to increase the EU's GDP by €415 billion. The digital economy offers a wealth of opportunities, such as market expansion, development of services and improvement of their quality, price reductions, launching new products (thus giving consumers more choice), and job creation [9]. Recognizing these opportunities, the European Union pursues a strategy aimed at the development of the digital single market. This strategy is based on three pillars, given in Figure 1.

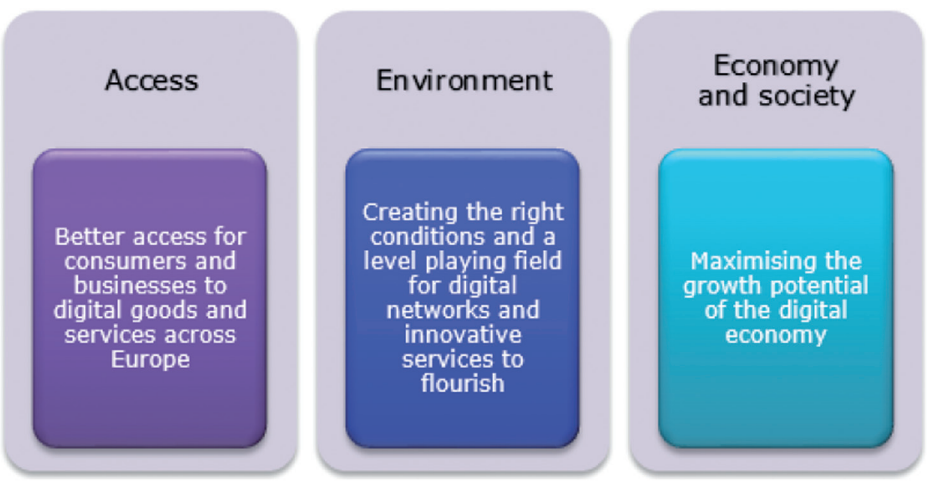

Fig. 1. Pillars of the digital single market

Source: Digital Single Market, https://ec.europa.eu/digital-single-market/en /digital-single-market accessed on January 17, 2017.

To gain a better understanding of the objectives of the three-pillar approach, one should envision market situations in which the consumer and the enterprise come from different countries. The overarching goal of these pillars is to develop a framework for EU companies and consumers within which e-commerce could be pursued across state borders. In particular, the strategy lays down the following tasks [9]:

1. drafting rules for cross-border e-commerce (a common set of regulations concerning e-commerce, consumer protection, dispute resolution),
2. improving cross-border parcel delivery (determining the needs and the means for ensuring affordable high-quality parcel delivery services),

3. preventing geo-blocking (restrictions based on geographic location and market segmentation; e.g., offering different rental prices for the same car in the same place to consumers from different geographic locations),
4. improving access to digital content (e.g., by modification of copyright law so that consumers could use digital content purchased in their home countries in all Member States),
5. simplifying and harmonizing electronic VAT registration and payment mechanisms (synchronization of VAT systems),
6. eliminating roaming charges (also for data transfer),
7. identifying consistent objectives and criteria for spectrum assignment and release of the 700 MHz and 800 MHz bands,
8. developing a framework for audiovisual media available on the Internet, promoting European works, protecting minors, and establishing advertising rules,
9. analyzing the role of Internet platforms and the way they affect other economic entities competition-wise,
10. combating illegal content without detriment to the providers of hosting services and legal content,
11. developing technological and industrial resources to improve cybersecurity and foster trust in digital services,
12. promoting digitalization of enterprises and the economy,
13. developing Big Data, cross-border data use, and cloud computing,
14. implementing standardization and interoperability under a digital single market (under the ICT standardization plan),
15. raising digital qualifications of society and improving education and training systems (adaptation to the digital revolution),
16. developing interoperable e-administration (e.g., the once-only principle, according to which public and ministration asks the citizen for data only once),
17. transitioning to e-procurement.

The idea of a digital single market entails the removal of impediments to transactions concluded over the Internet, which means embracing the concept of a single market while seeking to eliminate barriers. These objectives were designed and are pursued with a view to promoting economic prosperity and ensuring the free movement of goods, services, people, and capital. The digital single market strategy is an extension of a paradigm delineated in previous documents, namely [11]:

- the Lisbon Strategy,
- "Europe 2020" strategy, including the digital agenda for Europe.

With respect to the above objectives and the digital single market, it should be noted that the European Union strives for closer ICT, legal, economic, and knowledge integration. Indeed, integration in the fields of the Internet, accessibility of services, information management, legislation, and security becomes increasingly important not only to regional (national) economies, but also the international economy. From a global perspective, inadequate efforts and insufficient cooperation between the Member States may slow down technological and economic progress. Unfortunately, it should also be borne in mind that many interest groups and corporations, as well as some other market actors, oppose any measures aimed at greater transparency or a more level playing field.

3. SIGNIFICANCE OF THE DIGITAL SINGLE MARKET IN THE GLOBAL ARENA

The implementation of a digital single market is critical in the face of the growing global influence of other highly developed and developing countries (the USA, Canada, New Zealand, Singapore, Hong Kong, South Korea, Israel, Japan), as shown in Figure 2. The economic strength of European countries, associated with IT advancement and improved functioning of society, lies in opening up the Internet frontier so that the member states would be more competitive with respect to one another than countries from other continents.

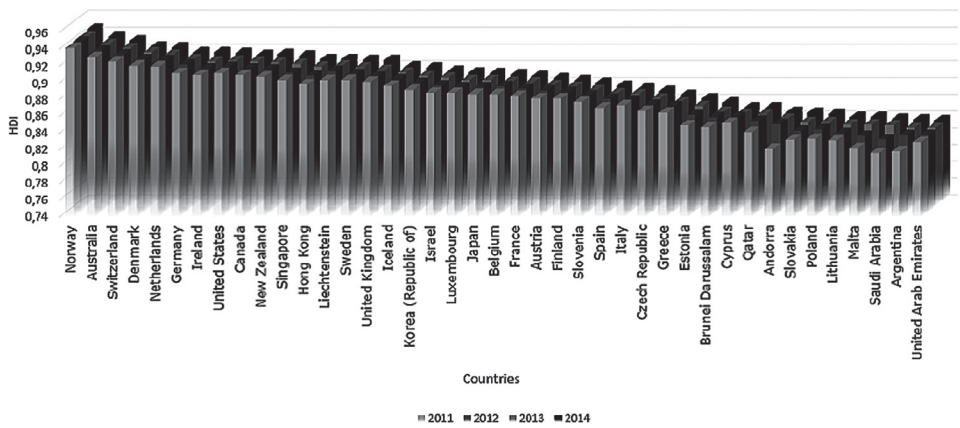

Fig. 2. Human Development Index Ranking of 41 selected countries

Source: Based on Human Development Data (1980–2015) from the United Nations Development Program, http://hdr.undp.org/en/data#, accessed on January 22, 2017.[5]

Figure 2 shows 41 countries from Europe and other continents ranked by the Human Development Index (HDI), which reflects the average level of social development in a given country. The HDI is a composite statistic of life expectancy (health), educational attainment, and gross domestic income [4].

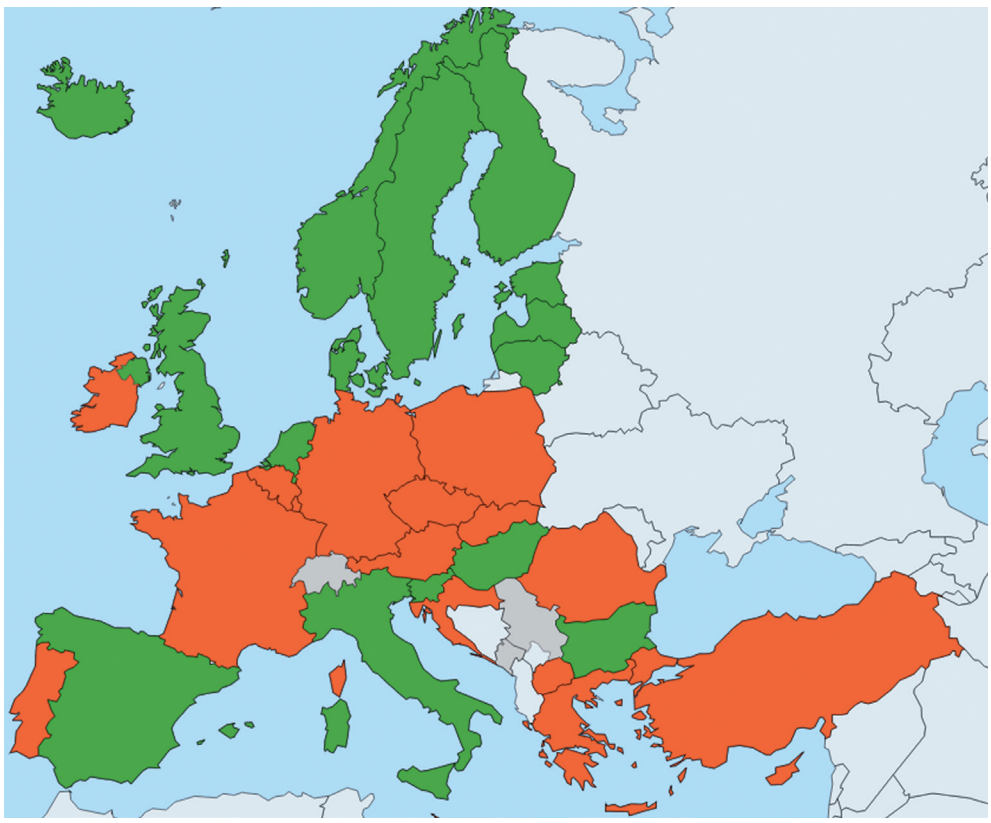

Fig. 3. Individuals' level of Internet skills (% of the total number of individuals aged 16 to 74)

Source: Eurostat Database http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tsdsc470&plugin=1 accessed on January 22, 2017

Figure 3 presents percentage levels of Internet skills among 16–74-year-old respondents who completed 3 or 4 out of 6 designated tasks related to I nternet use; those tasks included using a search engine to find information, sending e-mails with attached files, posting messages to chatrooms, newsgroups or other online discussion forums, using the Internet to make telephone calls, using peer-to-peer file sharing for exchanging movies, music etc., and creating a web page. Red color was used to mark countries in which those tasks were carried out by 15–35% of the population, while results in the range of 35–50% were marked in green. As can be seen from Figure 2 and from the green areas in Figure 3, Internet skills largely correspond to the country's level of development.

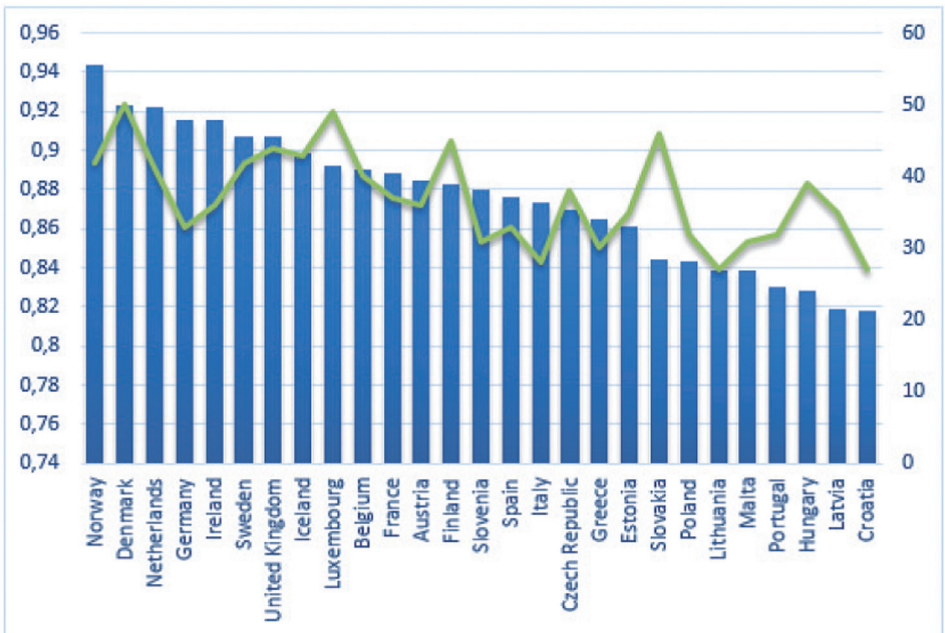

Fig. 4. Combined HDI and Internet skills chart

Source: Based on Eurostat and Human Development Data (1980-2015) [4] accessed on January 22, 2017.

This conclusion is corroborated by the combined charts given in Figure 3, which shows Internet skills levels superimposed on the HDR ranking. This suggests that the country's development is correlated with increased use of Internet resources as well as with the emergence of society in which Internet is used for more complex and advanced purposes.

The development of a digital single market pursuant to this strategy is crucial to the country's overall prosperity as it indirectly affects many areas of life. Access to domestic and international digital services may also translate into health (e.g., automated IT systems for calling emergency services by vehicles in the event of a traffic accident), transport, delivery of resources, tourism, fast execution of transactions, and access to basic information. Therefore, those regions of the world with more developed digital services markets will enjoy much better information supply and processing, with important implications for all aspects of society and the economy.

CONCLUSION

The analyses presented in this paper lead to the following conclusions:

1. There are many arguments in favor of building a digital single market, which can be developed based on existing trans-European telecommunications networks.
2. One of those arguments is technological progress, which has already resulted in better and faster means of transport. Efficient ICT networks are necessary, e.g., to coordinate transport processes. In practice, the profusion of technological solutions poses a problem to the functioning of enterprises in the European market

3. A considerable body of research shows that a country's development is correlated with its use of Internet resources and other ICTs. To attain growth, in addition to adequate infrastructure, society must be equipped with the skills necessary to use it in an economically advantageous manner.
4. The European Union is developing trans-European telecommunications networks. They will be used to deploy an e-government system enabling public administration to use the Internet to streamline, accelerate, and modernize services for the inhabitants of the European Community.
5. The digital single market is also important to maintaining and increasing the integration of individual Member States. The harmonization of the technical parameters of networks and services will facilitate the development of relations between enterprises and citizens from different countries. An example of harmonization is the European Union's policy on convergent pricing of telecommunications services offered to consumers in all Member States.

A new perspective on the importance of internet skills and the development of society has been identified. Thus, not only the capabilities of information technology and telecommunication capabilities alone have an impact on economic development, but more and more the skills of users. Technological advances force skills, their lack makes the state, despite having IT and telecommunications facilities, have to develop the society in terms of information technology. Therefore, the development of IT education will have a significant impact on the future of the country.

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BUDOWANIE EUROPEJSKIEGO RYNKU CYFROWEGO NA BAZIE TRANSEUROPEJSKIEJ SIECI TELEKOMUNIKACYJNEJ

STRESZCZENIE

Rozwój technologii telekomunikacyjnych jest obecnie jednym z głównych sił napędowych, ale też potencjalnych hamulców rozwoju branży transportowej. Z roku na rok rośnie ilość oraz poziom skomplikowania nowoczesnych systemów transportowych, w tym tych z obszaru ITS oraz C-ITS, w pełni wykorzystujących obecne możliwości systemów telekomunikacyjnych. Miasta inwestują w inteligentne systemy sterowania ruchem, zaś technologie autonomicznych pojazdów są już faktem. Najważniejszym celem jest stworzenie jednolitego rynku cyfrowego. Istniejące sieci telekomunikacyjne poszczególnych państw członkowskich mocno różnią się od siebie, prowadząc do różnicy zarówno w jakości jak i cenie usług. Internet oraz usługi telekomunikacyjne na najwyższym poziomie są już integralnym i nieodłącznym elementem funkcjonowania gospodarki i życia mieszkańców Europy. Jednolity rynek cyfrowy niesie ze sobą szereg korzyści, ale też musi przezwyciężyć pewne bariery, zarówno te już zidentyfikowane, jak też te, które na identyfikację dopiero czekają.

SŁOWA KLUCZOWE

telekomunikacja, umiejętności korzystania z Internetu, jednolity rynek cyfrowy, transeuropejskie sieci telekomunikacyjne